FMEJA Vol. 2, Issue 3, Page: 14-30, March 2020, ISSN: 2676-2749
Impact Factor (SJIF): 7.807
Journal DOI: 10.15373/22501991
International Peer Reviewed & Refereed Journal with Indexed Journal Platforms

web: www.damaacademia.com
email: editor@damaacademia.com
Download from Journal site
https://damaacademia.com/fmeja/

Author(s)
Cornelius Adablah (PhD)
Institute of Project Management Professionals, Faculty of Competency-Based Training & Learning
Email: cornelius.adablah@gmail.com

David Ackah (PhD)
Texila American University
School of Business
Email: drackah@ipmp.edu.gh

Correspondence
Cornelius Adablah (PhD)
Institute of Project Management Professionals, Faculty of Competency-Based Training & Learning
Email: cornelius.adablah@gmail.com

Compounding Intervals, Interest Rate and the Consequences of Negative Interest Rates in Corporate Finance

Cornelius Adablah (PhD) | David Ackah (PhD)

Abstract
The Bank of Japan has recently decided that it will cut its rate below the zero percent mark. Bank of Canada has also hinted that it may also join the Bank of Japan in this extreme step and drop its interest rates below zero as well. However, most average people in the world are dumbfounded at the concept of negative interest rates. Nobody really understands what they are and how they might help! In this article, we will explain the concept of negative interest rates in detail. A negative interest rate is a strange scenario in which theoretically banks will have to pay their borrowers negative interest. It is a strange system wherein borrowing money is a financially wiser thing to do than saving it. Savers will lose money when they deposit it in a bank. Then this same money will be transferred to the borrowers. This idea is very difficult to understand given the fact that everything associated with it looks bizarre. Theoretically there are two types of interest rates, simple and compounding. However, in finance the word interest usually refers to compound interest. Simple interest almost never factors in financial calculations. In all calculations related to present values and future values, compound interest is used. However, as a student of corporate finance, it is essential to know the difference that compounding intervals have on the effective interest rate that is paid on the investment.

Keywords: *Compounding Intervals, Interest Rate, Negative Interest Rates*

1.0 INTRODUCTION

Corporate finance is one of the most important subjects in the financial domain. It is deep rooted in our daily lives. All of us work in big or small corporations. These corporations raise capital and then deploy this capital for productive purposes. The financial calculations that go behind raising and successfully deploying capital is what forms the basis of corporate finance. The basis of corporate finance is the separation of ownership and management. Now, the firm is not restricted by capital which needs to be provided by an individual owner only. The general public needs avenues for investing their excess savings. They are not content with putting all their money in risk free bank accounts. They wish to take a risk with some of their money. It is because of this reason that capital markets have emerged. They serve the dual need of providing corporations with access to source of financing while at the same time they provide the general public with a plethora of choices for investment.

The corporate finance domain is like a liaison between the firm and the capital markets. The purpose of the financial manager and other professionals in the corporate finance domain is twofold. Firstly, they need to ensure that the firm has adequate finances and that they are using the right sources of funds that have the minimum costs. Secondly, they have to ensure that the firm is putting the funds so raised to good use and generating maximum return for its owners. These two decisions are the basis of corporate finance and have been listed in greater detail below:

As stated above the firm now has access to capital markets to fulfill its financing needs. However, the firm faces multiple choices when it comes to financing. The firm can firstly choose whether it wants to raise equity capital or debt capital. Even within the equity and debt capital the firm faces multiple choices. They can opt for a bank loan, corporate loans, public fixed deposits, debentures and amongst a wide variety of options to raise funds. With financial innovation and securitization, the range of instruments that the firm can use to raise capital has become very large. The job of a financial manager therefore is to ensure that the firm is well capitalized i.e. they have the right amount of

capital and that the firm has the right capital structure i.e. they have the right mix of debt and equity and other financial instruments.

Once the firm has gained access to capital, the financial manager faces the next big decision. This decision is to deploy the funds in a manner that it yields the maximum returns for its shareholders. For this decision, the firm must be aware of its cost of capital. Once they know their cost of capital, they can deploy their funds in a way that the returns that accrue are more than the cost of capital which the company has to pay. Finding such investments and deploying the funds successfully is the investing decision. It is also known as capital budgeting and is an integral part of corporate finance. Capital budgeting has a theoretical assumption that the firm has access to unlimited financing as long as they have feasible projects. A variation of this decision is capital rationing. Here the assumption is that the firm has limited funds and must choose amongst competing projects even though all of them may be financially viable. The firm thus has to select only those projects that will provide the best return in the long term. Financing and investing decisions are like two sides of the same coin. The firm must raise finances only when it has suitable avenues to deploy them. The domain of corporate finance has various tools and techniques which allow managers to evaluate financing and investing decisions. It is thus essential for the financial wellbeing of a firm.

1.1 Nominal and Real Value of Money

The previous article was an introduction about the two basic decisions that corporate finance helps a corporation in making. Prima-facie, these two decisions may look pretty simple. After all everyone raises money in their daily lives and puts it to productive use. Simple accounting can tell us whether or not we should make those financing and investing decisions. So, why is there a need for a complicated subject called corporate finance to make these decisions? Well, it turns out there is a need? The need arises because of this concept of nominal and real value of money. This article will explain why corporate finance is required: We are all intuitively aware of the concept of inflation. We know that money loses its value every year. The same amount of money will purchase less and less every year. Let's say that $100 is required to purchase a certain commodity of goods today. So if there is an inflation of 10%, the same goods will be available for a $110 next year. So, if we made an investment that was yielding 9% return this year, we would have a total of $109 next year from the $100 we had invested. In accounting terms, we would have a profit of $9. This is because we are only considering the nominal values. Nominal values do not consider the effect of inflation, opportunity cost of capital and such other forces which cause the value of money to decrease in a given time period.

Nominal values present a distorted image of the firm's performance to its shareholders and this is to say the least. Consider the case we discussed above. Here, the firm has lost 1% purchasing power. This means they were better off consuming the $100 in year 1 and could have purchased more goods with it rather than investing it and consuming $109 a year later. Thus, if nominal values are considered, firms will end up eroding their capital by investing their money in projects that offer a rate of return that is below the firm's cost of capital. To offset this problem, specialists in corporate finance have come up with the concept of real value of money. The real value of money takes into account inflation, opportunity cost of capital and such other forces. Thus, firms that base their calculations on these inflations adjusted values make better financial decisions as compared to those that do not. The calculation for both real as well as nominal values is simple and can be done with the help of the following formula:

$$\textbf{Real Value} = \textbf{Nominal Value} / (1 + (i / 100))$$

i = The prevailing inflation rate in the market

It must be understood that the real and nominal values of money are subjective. This is because, they are determined using the inflation rate. There is no single measure of inflation. The government itself produces multiple estimates of inflation. Also, for the purpose of the company's calculation, these measures may not be good enough. So the company may create its own inflation index depending on which the real values are calculated. Thus, there is widespread subjectivity in this calculation. Different companies use different rates to convert nominal values to real values. The biggest take-away from the concept of nominal and real values is that money in one-time period is not directly comparable to money in another time period. It is for this reason we have to calculate present values, future values and the like. These calculations form the backbone of corporate finance.

1.2 Two Fundamental Rules of Corporate Finance

Corporate finance is based on two fundamental rules. All tools and techniques of corporate finance are mere ways and means of implementing these rules. These rules can be found at the beginning of any and every corporate finance text book. One of these rules relates to the concept of return while the other relates to the concept of risk. We have described both these rules in this article. They are as follows:

Rule # 1: Money today is worth more than money tomorrow

The fundamental rule of corporate finance is that the timing of cash flows is of paramount importance. Also, we want the timing of the cash flows to be as soon as possible. The sooner we get the cash, the better it is for our company. Every dollar that the company has in cash today is better than the same dollar in cash tomorrow because of the following reasons:

- **Inflation:** Inflation eats into the purchasing power of the company's funds constantly with the passage of time. Thus if the company had the same nominal amount of money today or a year from now, they would be able to purchase more goods and services with the money that they have today as compared to the same amount of money a year later. Thus, to offset the effect of inflation, companies must conduct their business in a manner that they ensure that cash is received as soon as possible.

- **Opportunity Cost:** Also, every dollar that the company is not receiving has an opportunity cost of capital. Let's say the company's debtors owe it $100 and they pay $100 the next year. The nominal value of the money that they have paid is $100 however the real value is less. This is because had the debtors paid immediately, the company would have cash immediately on hand. They could then invest this cash in risk free securities and could have earned a year's interest on the same. By accepting the same $100 a year later, the company has in effect loaned out $100 to its debtors and that too interest free!

Rule # 2: Risk free money is worth more than risky money

Corporate finance involves exchanging between present and future streams of cash flows. Companies may come across different projects which offer different future cash flows. However, it is important to realize that all cash flows are not equally likely to materialize in the future. Some cash flows may be almost certain like investing in treasury bonds while others may be highly uncertain like projected returns from stock market investments. Hence, the second rule states that the company must adjust each of these cash flows for their risk before making any comparisons and selections. The following factors must be considered:

- **Return of Capital:** Some projects are extremely risky. Here, the company is concerned about whether or not the money they are investing will be recovered. A higher rate of return must be demanded from such projects to offset the likelihood of losing their entire capital that the investors face.

- **Return on Capital:** In other cases, the cash flow may be a little less uncertain. In these cases, companies must consider the low risk before making their decision.

The bottom line is that before making a choice, all projects have to be made comparable. This is done by adjusting for cash flow that will be received in different time periods as well as adjusting for the different amounts of risks that are involved in different projects.

1.3 Present Value and Future Value of Money

In the previous article we learned about the concept of nominal and real values of money. We realized that money today is more valuable than the same sum received at a future date because there is no risk involved in obtaining it and also the real value of money is not expected to decrease by the time we receive it. The simple implication of this is that we cannot compare the dollars we have on hand today to the dollars that we have been promised at a future date. In corporate finance, we call the value of money that we have on hand today the present value and the value of amount of money that we will receive at a future date the future value of money. In corporate finance, we may often come across complex schedules of payments and receipts. Sometimes cash may have to be paid today while sometimes

we may have to pay it at a later date. Similarly, the receipts may be today or at a later date. Hence, to calculate, we must first convert all the values to present values. This article will explain how to do so with the help of an example:

1.3.1 Calculating Future Values

Let's understand the future values calculation with the help of an example. Let's say that we have $1000 today and we have calculated that our cost of capital is 10%. This 10% reflects both the expectation of inflation i.e. fall in the real value of money as well as the risk involved in this investment. Let's consider that we have to invest this money for a period of 3 years. The formula for calculating the future values is as follows:

$$\textbf{Future Value = Present Value (1 + (cost of capital / 100)}^{\textbf{number of years}}$$

i.e. Future Value = $ $1000(1.10)^3$

i.e. Future Value = $ 1331

This means that the equivalent sum of money that we should expect in 3 years, given our cost of capital is $1331. This means that we should accept proposals where future value is more than $1331, reject proposals where future value is less than $1331 and be indifferent towards proposals where future value is equal to $1331. From henceforth, we will refer to this by stating that the future value of $1000, at our given cost of capital, for a period of 3 years is $1331. Also, it must be noted that future values are nominal in nature.

1.3.2 Present Values

Present values are the exact opposite of future values. During future values we were compounding a present value at a given rate to reach a future value. But in present value calculations, we will discount the future values, which are nominal in nature, at the given cost of capital for the given period to reach the present value. Let's look at it with the help of an example. Now, we have a proposal that offers to pay us $1000, 3 years from hence. Our given cost of capital is 10%. The formula for calculating the present values is as follows:

$$\textbf{Present Value = Future Value / (1 + (cost of capital / 100)}^{\textbf{number of years}}$$

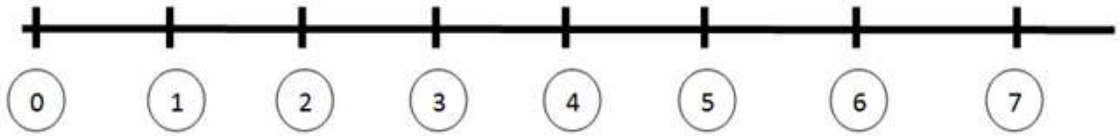
i.e. Present Value = $1000 / $(1.10)^3$

i.e. Present Value = $ 751.31

This means that the equivalent sum of money that we should expect today, given our cost of capital is $751.31. This means that we should accept proposals where present value is more than $751.31, reject proposals where present value is less than $751.31 and be indifferent towards proposals where future value is equal to $751.31. When the term present value is used, finance professionals are referring to the discounted present day values which are equivalent to nominal future values. The concept of present values and future values form the basis of corporate finance. Hence, it is essential that any student be well versed with these concepts. Variations of these concepts will be regularly used throughout the corporate finance course and hence due attention must be paid to mastering this concept before moving forward.

1.4 Net Present Value Calculations

The net present value (NPV) is the most important concept in corporate finance. It is on the basis of this concept that investment decisions are made or not made. It is on the basis of this concept that stocks and bonds are valued. Thus, it is an absolute imperative for any student of corporate finance to be thoroughly well versed with this concept. One needs to have a fair understanding of future and present value calculations to understand the net present value concept. The NPV is best understood with the help of a cash flow timeline. This article will use the same to explain it: **The Cash Flow Timeline:**



The cash flow timeline is a representation of the periods when cash is expected to be paid or received during the project. Point Zero, represents today. Hence all the amounts listed in point Zero are present values. We do not have to adjust them by compounding or discounting for the net present value calculations. The values listed under point 1 are the amounts that will be received or paid at the end of period one. The values listed under period 2 are the amounts that will be received or paid at the end of period 2, so on and so forth.

1.4.1 Future Values Occur in Different Periods

When we compare two numbers, we must ensure that that are of similar nature. Hence, when comparing cash flows we must ensure that all of them are either present values or future values belonging to the same future period. Comparing a present value to a future value or comparing a future value in period 1 to a future value in period 2 is like comparing apples to oranges. Since future values all occur in different periods, we cannot compare them with each other. The only way to add or subtract these values is if we bring them all back to day zero i.e. convert every future value to their equivalent present values.

1.4.2 Present Values Occur at the Same Time i.e. Day Zero

Since present values depict the value of money on day zero i.e. in the same period, it would be correct for us to add, subtract or perform any other mathematical operation on this number. The key point to understand is that all values involved in the calculation must be present values.

1.4.3 NPV Calculation Example

Let's consider the following schedule of cash outflows and inflows:

Period 0: $10,000 Cash Outflow
Period 1: $5,000 Inflow
Period 2: $4,000 Inflow
Period 3: $3,500 Inflow
Period 4: $3,000 Inflow
Cost of Capital is 10%.

The question is whether it is financially wise to invest $10,000 today and receive 4 installments of $5000, $4000, $3500 and $3000 if our cost of capital is 10%.

Solution:

Outflow: $10,000

Present Value of Inflows: PV (Inflow in Year 1) + PV (Inflow in Year 2) + PV (Inflow in Year 3) + PV (Inflow in Year 4)

$= (\$5{,}000/1.1)^1 + (\$4{,}000/1.1)^2 + (\$3{,}500/1.1)^3 + (\$3{,}000/1.1)^4$
= $4,545.46 + $3,305.79 + $2,629.60 + $2,049.04
= $12,529.89
Net Present Value = Present Value of Inflows – Present Value of Outflows
= $12,529 - $10,000
= $2,529

1.4.4 Net Present Value Rule

The net present value rule states that if the NPV of the proposal is greater than 0, it must be accepted. For less than and equal to zero the proposals must be rejected. In this case, the NPV is $2529. Hence, this proposal is financially sound given the cost of capital of the firm. It would be in their best interest to accept this proposal.

2.0 COMPOUNDING INTERVALS AND INTEREST RATE

Theoretically there are two types of interest rates, simple and compounding. However, in finance the word interest usually refers to compound interest. Simple interest almost never factors in financial calculations. In all calculations related to present values and future values, compound interest is used. However, as a student of corporate finance, it is essential to know the difference that compounding intervals have on the effective interest rate that is paid on the investment. We are all aware of the difference between simple and compound interest. However, just to reiterate, the principal amount never changes in a simple interest calculation. So if $100 are lent for 3 years at 10%

simple interest, the interest paid in each of the 3 years would be $10. But if $100 were lent at 10% for 3 years and compounding happens annually, the interest payments would be $10, $11 and $13.1 for years 1,2 and 3 respectively. This is because at the end of each period the accrued interest gets added to the principal and therefore the interest in the next period is a little bit more. In case of compound interest 10% compounded annually and 10% compounded semi-annually i.e. twice a year do not mean the same thing. Let's understand this with the help of an example:
Annual Compounding: $100 @10%, Interest = $10
Semi-Annual Compounding: $100 @10%, Interest $5 after 6 months and %5.25 after another 6 months. Hence the total interest would be $10.25 as opposed to $10 on an annual basis.

As we can see from the above example that semi-annual rates give more interest than the annual rates. We can extend this logic further and say that monthly rates will provide more interest as compared to semi-annual rates and weekly rates will provide more interest than monthly rates. As a thumb rule, we can say that the smaller the compounding intervals, the higher the interest rates will be. As far as investments are concerned, most rates are compounded annually or semi-annually. Smaller compounding frequencies are not used. In common usage, only in the case of credit cards are the rates expressed as monthly compounding interest rates.

2.0.1 Continuous Compounding

Until now, we have considered discrete intervals at which interest was being paid. We could bring the intervals down to hours, minutes or even seconds and yet they will be discrete. Theoretically it is possible that interest be paid continuously over a given period of time. This is not possible in reality. However, continuously compounded interest rates provide some ease in mathematical calculations. It is for this reason that they are often used in finance. Compounded interest rates can be converted into continuously compounded interest rates by multiplying them with

$$— e^{rt}$$

Where:
e = 2.718
r = annually compounded rate of interest
t = number of time periods

2.1 Negative Interest Rates

The Bank of Japan has recently decided that it will cut its rate below the zero percent mark. Bank of Canada has also hinted that it may also join the Bank of Japan in this extreme step and drop its interest rates below zero as well. However, most average people in the world are dumbfounded at the concept of negative interest rates. Nobody really understands what they are and how they might help! In this article, we will explain the concept of negative interest rates in detail. A negative interest rate is a strange scenario in which theoretically banks will have to pay their borrowers negative interest. It is a strange system wherein borrowing money is a financially wiser thing to do than saving it. Savers will lose money when they deposit it in a bank. Then this same money will be transferred to the borrowers. This idea is very difficult to understand given the fact that everything associated with it looks bizarre!

2.1.1 Bizarre Scenarios to Negative Interest Rates

Since people would be better off spending money than saving it, everyone would want loans and no one would save any money! How banks will lend money until no one saves it in the first place is a mystery! Also, if people were to just bury their money in the ground, they would be better off than depositing the same money in a bank or making any other investment. The financial services industry would cease to exist in case negative interest rates became a reality. People pay fund managers to get the highest returns possible. Why would anyone pay fund managers to get the highest negative return? Businesses would not want to collect their receivables. Since taking money later is more valuable, people would postpone their debt collections indefinitely.

The visualization of these bizarre scenarios is what makes this scenario so intriguing. Most people, even experts, have a hard time getting their heads around what a negative interest rates world would look like. Warren Buffet once famously stated that interest rates are like gravity! In reality they truly are like gravity for the financial world. If the interest rates are lower, then the valuation of investments starts to go up. All values go higher regardless of asset class. Stocks, bonds, gold and everything else will go up. The difference is that some assets will go up more than others.

At the same time if interest rates are high, all asset classes start collapsing in value. The proof of this can be obtained by collecting data from the period when Paul Volcker raised interest rates close to 20%. People know the effect of high interest rates and low interest rates. However, no one is aware about the effect of negative interest rates. At most, it was assumed that negative interest rate would be a temporary phenomenon. However, it seems like negative interest rates will prevail in the long term. How exactly will it affect the economy? This is a question that no-one can answer with any degree of accuracy.

2.1.2 Interest Rates Already Near Zero

Apart from Japan and Canada, many more countries are likely to follow the negative interest rate route. This is because the economy of the world was shaken by the 2008 crisis. All countries were on the verge of bankruptcy. To make sure that their economy survives, almost every economy reduced their interest rate. This ended up temporarily boosting local economies. However, after a period of time, these countries once again have faltering economies. But now the problem is that they do not have much room to cut interest rates. Interest rates are already close to zero! Economics call this the zero bound limit Nations and central banks have never ventured into the unchartered territory of negative interest rates. This is an experiment and the world is waiting intently to observe the results. If economic fundamentals are to be believed, the results are unlikely to be any good.

2.1.3 Average Customers Do Not Get the Benefit

Another conjecture regarding the negative interest rate theory is that end consumers would not be subject to negative interest rates. Negative interest rates will be applicable to interbank lending between the central bank and other commercial banks. This does seem to be a lot more plausible than the scenario explained above. So end consumers may have to pay interest rates that are a lot lower than they paid earlier. In some cases, customers may not be subject to interest rates at all! However, experts rubbish the possibility that negative interest rates can ever prevail at the retail level for a prolonged period of time. Other experts argue that this is giving special treatment to the banks while leaving the retail borrower and depositor out of a good deal. There are several sides to this argument. However, all we know till now are conjectures. When Bank of Japan does implement its negative interest rate policy, the world will get its first glimpse of what this strange world would look like.

2.2 Opportunity Cost of Capital

Opportunity cost of a capital is a term unique to economics and finance. It is unique in the sense that you will not find mention of opportunity cost of capital in the accounting books. It is not an explicit cost which is paid out of the pocket. Hence, there is no mention of this cost in the accounting records. Rather, it is an implicit cost which results out of our investment decisions. This article will explain about opportunity cost of capital and how it must be used while making financial decisions: Opportunity cost of capital represents alternate uses of money. Let's say, if I have a $1000 to invest and I decide to invest the money in the stock market, I am committing my resources. By investing $1000 in the stock market, I will now not be able to use the same $1000 for any other purposes now. I must therefore ensure that I am committing my resources to the best possible project. Let's say, I have a choice between real estate and stock market investment, when I choose the stock market investment, I make it my best possible choice. Opportunity cost of capital tells us what we are foregoing to choose that best possible alternative. Opportunity cost of capital is therefore the value of the second best alternative.

2.2.1 Alternate Projects Must Share Similar Risk Profile

However, we must ensure that we compare opportunity costs of capital across similar projects. This will ensure that we do not see a biased picture and end up choosing the wrong projects. Consider a comparison between a stock market investment and government bonds. Usually, stock markets will offer more return compared to government bonds. So, using government bonds as the opportunity cost will always make them look good. But stock market investments and government bond investments have very different risk profiles. One guarantees a fixed rate of return whereas there are no guarantees in the other. Hence, using one as the opportunity cost of capital for another will provide a skewed picture and the risky alternative will always be chosen. Hence, only projects with similar risk must be used for opportunity cost of capital calculation. This makes these calculations very subjective and open to debate.

2.2.2 Alternate Uses Represent Implicit Costs

The investment decision is all about prioritizing. It is about choosing the best possible alternative. So, if we have 2 alternatives, one which offers a $100 return potential whereas another which offers an $80 return potential, then by choosing one alternative we are alternatively foregoing the other one. So, if we choose to get a $100 return, we are foregoing the $80 return. Corporate finance captures this implicit tradeoff in the expected rate of return number.

2.2.3 How Opportunity Cost Helps in Decision Making?

Opportunity cost helps in choosing the right project when faced with a variety of alternatives. Here is how the decision is affected:

- ***Higher Opportunity Cost Lowers NPV*:** A higher opportunity cost implies a bigger discount rate. A bigger discount rate means that the future values are worth considerably less today. This creates a situation where the NPV is lowered. A high opportunity cost of capital raises the bar for all other projects as well.

- ***Only the Best Investment Has Positive NPV:*** Also, we need to understand that in a given set of 2-3 investment proposals, only the best proposal will have a positive NPV. This is because the best proposal will be the opportunity cost of capital for the other projects. Since the opportunity cost of capital will be higher than the cash flows that the project has to offer, the NPV of such a project will be negative. One just needs to be careful about the risk profile of different projects to ensure an "apples to apples" comparison.

2.3 Valuing Cash Flows in Different Periods

Cash flows vary from project to project. In some cases, cash flows will occur evenly over time. There might be payments of similar amounts that will be spread out over a time period at regular intervals. On the other hand, there might be payments which are irregular and have no pattern whatsoever. The challenge in corporate finance is to value these different streams of cash flows. Here is how this is done:

2.3.1 Present Value of a Stream of Cash Flows

The present value of a stream of cash flows can be expressed as a lump sum amount. This can be done only after all the expected future receipts are converted to their present day values. The sum of these values is then equal to the value of the expected stream of cash flows. This is exactly how the value of a future stream of payments is derived.

2.3.2 Nature of Cash Flows

The calculation of the present value of the future stream of money depends upon the nature of the cash flows. If the cash flows are spread out in an even pattern, shortcuts like annuities and perpetuities can be used and the value of large streams can also be calculated very easily. However, if the cash flows are uneven, individual payments have to be discounted to their present value and then all those payments need to be added up.

2.3.3 Inflation Forecasts May Change Over Time

Now, there are many investments that go on for a period of 10 years, 15 years and so on. The inflation forecast does not remain the same over such an extended period of time. In fact, historically, the inflation will change every time there is a change in the business cycle. Hence, for investments over a long period of time, multiple inflation forecasts may be required where different rates are used in different years.

2.3.4 Uncertainty Increases with Time

Moreover, in projects where cash flow goes on for multiple years, the uncertainty also increases with increased time. It is a fundamental rule in corporate finance that the farther the expected payments are, the more uncertain they are. This is because over an extended period there might be political, economic or social changes that might affect the cash flows. Hence different rates may be used to discount the cash flows in different years to get a more accurate picture.

2.3.5 Multiple Discount Rates

Analysts almost always use multiple discount rates to represent the different uncertainties that cash flows in different years have inherent in them. Moreover, the value of the future cash flows is highly sensitive to discount rates. Hence, small changes in the discount rate can bring about big changes in valuation. This, coupled with the fact that discount rates are very difficult to predict in advance makes investing an art rather than a science.

2.4 Perpetuity Concept

Perpetuity is a very important concept in corporate finance. The concept of perpetuity makes it possible to value stocks, real estate and many other investment opportunities. The valuation of perpetuities is theoretically very simple. The concept of perpetuity as well as the formula required for its calculation has been explained in this article: In corporate finance, we try to compare the value of different streams of cash flows. Sometimes, we exchange a lump sum value for a finite stream of future payments. However, in case of perpetuity, the payments will never cease. A perpetuity is basically a stream of cash flows that never terminates. This means that if we purchase a perpetuity right now after paying a certain lump sum, we should expect repayments that last till the end of time.

Although, valuing a perpetuity may not seem intuitive in the first place, it is required. There are many forms of investments that mimic the features of a perpetuity. Consider the example of common stocks. Common stocks are basically an investment in the operations of a company. Theoretically the company has an infinite life. Therefore, the shareholder is entitled to an infinite stream of future dividends for paying the stock price now. It is for this reason that common stocks are valued as a perpetuity. Similarly consider the example of real estate. Once the purchase price of real estate has been paid, the owner is entitled to receive an infinite stream of rental payments. Thus real estate is also valued as a perpetuity. Many universities have endowment funds that pay scholarships to students. They have been doing so for centuries and plan to continue to do so forever. These funds were invested in a perpetuity by a philanthropist many years ago. Now it continues to make payments till the end of time.

The most counter-intuitive part of perpetuity is the fact that it has a finite value. The question that comes to everybody's mind is that how can a series of infinite cash flows have a finite valuation. The answer is because the real value of future cash flows keeps on falling. The present values are high in the early years. However, the payment amount is fixed under a perpetuity. Therefore, in the later years as and when inflation keeps on increasing, the real value of the payments are continuously decreasing. It is because of this that the cash flows in the very distant future will have a near zero valuation although it will never exactly be zero. Hence using the formula for sum of an infinite series, the value of a perpetuity can be calculated.

Formula for Valuing Perpetuities

The formula for valuing perpetuities is very simple and straightforward. It is as follows:

$$PV = C / R$$

Where:

PV is the present value of perpetuity

C is the amount of cash flow received every period

R is the required rate of return

2.5 Growing Perpetuity

We have seen that a perpetuity represents an infinite stream of future cash flows. However, we have also seen that as time passes the value of these cash flows constantly diminishes. $100 may be able to buy us quite a few goods today, but in 50 years' time $100 will not be nearly as valuable as it is today. It is for this reason that receiving infinite payments is not enough. The payments must also keep growing at a certain rate. This will ensure that they are not considerable behind inflation. This is the idea behind a growing perpetuity. The same has been explained in detail in this article: As already stated, a growing perpetuity involves payments that do not remain fixed. Instead these payments keep on growing at the same constant rate of growth. So, if the rate of growth of the payments is 7%, each payment will be 7% more than the payment received before it. The present value of a growing perpetuity can be derived from a complex mathematical calculation. This is because a growing perpetuity is also an infinite series which has a finite sum. For our purposes, we can just remember the formula required for our calculation.

$$\textbf{Present Value (Growing Perpetuity)} = D / (R - G)$$

Where:

D = Expected cash flow in period 1

R = Expected rate of return

G = Rate of growth of perpetuity payments

However, we need to understand that for this formula to hold true, G must always be greater than R. If G is less than R or equal to R, the formula does not hold true. This is because, the stream of payments will cease to be an infinitely decreasing series of numbers that have a finite sum. Growing perpetuities are found in a variety of places in our daily lives. Some of them have been mentioned below:

- **College endowment funds** need to be growing perpetuities. This is because with the passage of time, tuition and other expenses will become more and more expensive. Hence the college endowment funds must keep growing to meet the scholarship demands represented by growing expenses.

- **Stock valuations** always assume a growing perpetuity for their terminal value calculation. Without the concept of a growing perpetuity it would be impossible to value a stock.

- **Loss of Real Value of Money:** Since the formula assumes that the growth rate of the perpetuity will always be less than the required rate of return, it is implying a loss scenario. This is because, no matter what the case, the growth rate can, by definition, never be more than the required rate of return.

The growing perpetuity, thus assumes that we will lose a small amount of the real value of money every year. Just like the perpetuity, a growing perpetuity can only be summed up because the series is infinitely decreasing. The growing perpetuity assumes that we will lose the real value of money at a slower rate as compared to an ordinary perpetuity.

2.6 Annuity Concept

An annuity, just like a perpetuity, is a shortcut used while making present value calculations. Unlike the perpetuity, which is very difficult to find in real life, we find examples of annuity all around us. The monthly mortgage payments we make, the car loan or student loan that we pay off are all annuities. Annuities play a very important role in corporate finance. They form the basis for valuation of bonds and other financial instruments. This article provides more information about the concept of an annuity:

Finite Stream: The first and foremost difference between an annuity and a perpetuity is the fact that an annuity has a finite life. Unlike perpetuities, annuities do not go on forever. It is for this reason that we they are conceptually more intuitive and easy to understand.

Equal Amounts: A stream of payments can be called an annuity, if and only if, all the payments in that stream of future cash flows is of equal amounts. For instance, if the future cash flows for 4 consecutive years from now are $100 in each year, then this stream is called an annuity. On the other hand, if the future cash flows for the next 3 years are $100 and the 4th year is $110, then this stream of cash flows cannot be called an annuity. (It is an annuity if you consider years 1 to 3)

***Equal Time Lag*:** Every payment in the stream of cash flows should be equally spaced. This means that if payments are being made on a monthly basis, all payments should be made on a monthly basis. If the time lag when payments are made is changing, then the cash flow schedule cannot be classified as an annuity. This is because the annuity formula assumes that the cash flows are evenly spaced out.

Same Interest Rate: A stream of cash flows can be called an annuity, if the interest rate being charged throughout the period is same. For instance, if the rate of interest across the entire duration of a 10-year loan is 10%, then the stream of payments can be classified as an annuity. On the other hand, if the rate of interest keeps varying from year to year, then it cannot be valued as an annuity because the annuity calculation formula assumes the same interest rate.

***Amortization Concept*:** The payments in an annuity represent amortization of a lump sum amount. This means that although the amount paid in installments is constant, its internal components are changing. Let's understand this, with the help of an example. Let's say that there is a $100 payment per month for the next 5 years. Now, the $100 amount will remain constant for the next 5 years, however the internal components will change. The first payment may represent an $80 interest charge and $20 repayment of principal while the last payment may only represent $10 interest and $90 repayment of principal. This is called amortization. The first few payments in an annuity have very

high interest components. With the passage of time, the interest component becomes smaller and smaller and repayment of principal amounts becomes larger and larger.

3.0 ORDINARY ANNUITY VS. ANNUITY DUE

Annuities can be divided into two types based on the exact time when the payments occur in a given period. The payments could either occur at the beginning of every period or the payments could occur at the end of every period. For instance, when you take a house on rent, the rent is usually paid in advance whereas when your mortgage payments are usually made at the end of every period. So the payments made at the end of every period are called ordinary annuity. This is because ordinary annuity is the usual state of affairs. Usually all annuities are paid at the end of the period. Alternatively, when annuity payments are made in advance, we call them annuity due. The difference in the formula to calculate the two different types of annuities is very small. Also, the difference in amounts is not expected to be large either. However, to be precise, a student of finance must know the difference between ordinary annuity and annuity due and know when to use the formulas.

One Extra Period: As we seen that ordinary annuity payments are made at the end of each period whereas the payments for annuity due are made at the beginning of each period. Hence, the difference between ordinary annuity and annuity due is one extra period. Thus, an adjustment needs to be made for this one extra period while calculating both the present value and future value of an annuity due.

Future Value of an Annuity Due: Let's say that we want to calculate the future value of an annuity which pays $100 for 5 years and the payments begin at the beginning of the first period. The rate of interest is 10%. If we used the regular annuity formula or table, we would be given the future value of the above case as $610.51. However, this is the value if the payments were made at the end of each period. To convert them into annuity due we need to account for the one extra period. So we further multiply the answer by (1+i). In our case, since the interest rate is 10% per annum, we multiply it by 1.1. So the future value of the same example would be $610.51*(1.1). In this case the answer is $671.56 Calculating the present value of annuity due is a simple 2 step procedure: First, you calculate the future value as a regular annuity and secondly, you compound the future value, so derived, for an additional period

Present Value of an Annuity Due: Let's say that you were to receive 5 annual payments of $100 each for the next 5 years beginning at beginning of each period and your required rate of return is 10% per annum. If we used the regular annuity formula or table, we would be given the present value of the above case as $379.08. However, this is the value if the payments were made at the end of each period. To convert them into annuity due we need to account for the one extra period. So we further divide the answer by (1+i). In our case, since the interest rate is 10% per annum, we divide it by 1.1. So the present value of the same example would be $379.08/(1.1). In this case the answer is $344.6. Calculating the present value of annuity due is a simple 2 step procedure: First, you calculate the present value as a regular annuity, and Secondly, you discount the present value for an additional period Please note the difference. While calculating future values, we compounded the result for an extra period i.e. we multiplied. On the other hand, while computing present values, we discounted for one extra period i.e. we divided the result. The concept of annuity due will be hidden in the question i.e. it will not be explicitly stated. Hence, one must pay attention to when the payments are being made to determine whether it is an ordinary annuity or an annuity due.

3.1 Different Types of Annuity Calculations

In this articles, we learnt that the value of a dollar today is not the same as it will be 10 years from now. Then, we came across annuities which are a powerful mechanism that ensure that the nominal value of the payments remain the same throughout the years whereas its internal components i.e. interest and principal keep on changing. Annuities, therefore give a very useful way to work with a schedule of payments. There are various types of payment schedules possible while working with an annuity. Here are some of the important types:

Lump Sum to Annuity Payments: Annuities can convert a lump sum payment today into a series of future cash flows which will have the exact same value as of today. This is useful in business because usually the outlays required have to be done immediately in a lump sum whereas the benefits arrive at a later date and they arrive in installments. Annuities therefore enable us to draw a comparison between these values and decide if they are beneficial to us. Example: Assuming a 12% rate of return for the next 5 years, an annual payment of $27.74 has the same present value as a $100 payment today. So we can choose between making a $100 payment upfront or choose a 5 year annuity of $27.74

Annuity Payments to Lump Sum: The reverse of the above calculation is also true. Annuities help us to take a series of future equal payments that will be made at equal periodic intervals and come up with a lump sum present value that is equal to those payments. This too is very useful. Let's say that you are scheduled to make mortgage payments for the next 5 years. But instead you choose to pay upfront and close the loan. What is the amount that you should pay to the lender? Annuity calculations will help us come up with that amount. Example: Assuming a 14% interest rate for the next 5 years and an annual payment of $100, the present value of this stream of payments is $343.31

Partial Lump Sum: Now, in the above cases we were converting lump sums into equal payments or equal annuity payments into lump sums. Annuity calculations can be used to arrive at the calculation of the two as well. The payment maybe partially made in equal installments and partially paid in a lump sum. For instance, if you owed the bank $500, you could pay $200 upfront and convert the balance into an annuity. Annuity calculations allow you to convert any lump sum or stream of cash flows into any other lump sum or stream of cash flows or a combination of both. These calculations form the backbone of finance and it is difficult to imagine the financial world without them.

4.0 BOND VALUATION AND HOW IS IT CALCULATED

The present value of a bond is the sum of all the future cash flows that can be derived from it. In this sense, the valuation of bonds really becomes simple, isn't it? All we need to do is find out the future stream of payments that are due on the bond and then find out their present value and we call find out what the valuation of that bond is. Well, this may be theoretically this simple. However, in practical life estimating the parameters like discount rate which go into the calculation can be very difficult. Also, using different discount rates can cause us to come up with very different valuations. So, bond valuation really is a game about guessing what the future discount rate will be. Now, let's have a look at a theoretical example of bond valuation. Here is a step by step procedure of how the calculation must be done:

Two Components: The calculation of the present value of the bond is done in two components. They are as follows:

Annuity: Bonds have a series of coupon payments that are due. Coupon payments are interest payments that are made periodically. Usually the frequency of paying interest is semi-annual. Corporations all over the world pay interest twice a year because it is a bond market convention. Also, it must be understood that bonds can have 2 values. The face value is the original issue value of the bond whereas the market value is its current market price. So, if the interest payments are not directly given, we need to compute them using the face value. Remember that interest payments are always computed using face value and not market value! Hence, the annual interest rate needs to be converted into a semi-annual rate or whatever rate is appropriate. Then, it must be plugged into the annuity formula along with the other details to derive the present value of the coupon payments that are due.

Lump sum: Bonds usually pay interest throughout their lives. However, they pay back the principal at the end of their lives. The principal therefore is a lump sum payment that may have to be discounted many years into the future. Now, even though this payment is not being received twice a year, we will still consider the semi-annual interest rates to find out the present value of the lump sum payment. The final step is to add the present value of the annuity as well as of the lump sum payment. This adds the present values of the interest payments as well as the principal payments. Hence, we get the present value of the bond.

Let's find the present value of a bond whose face value is $100. Interest rate is 12% on an annual basis. The bond will make semi-annual interest payments for 10 years after which the principal has to be repaid and the bond expires.

4.1 Present Value of Interest Payments

Number of periods = 20 periods (10 years, however the payment is semi-annual)
Discount Rate = 6% per period (Since we have doubled the number of periods, we need to cut the discount rate into half)
Payment: $6 per period (6% * face value of $100)
Therefore, present value of the annuity equals $68.82. This is the present value of the interest payments due.

4.2 Present Value of Principal Due

The principal that needs to be repaid is $100. It needs to be repaid after 20 periods and the discount rate we are considering is 6% per period. The present value of the principal therefore is $31.18 To find the present value of the bond we need to add $68.82 + $31.18. In this case, this adds up to $100. Therefore, the present value of the bond is $100. It must, however be noted that in real life bond values swing based on the expectation of what the future discount rate will be like. It is not really the current discount rate which determines the bond value!

4.3 Bond Market Conventions

While calculating present values of bonds, one may observe that some of the information required to compute the present value is actually missing from the question. However, this is not an error. One needs to understand that the examiner is in a way testing your knowledge of how the bond market works. In the bond market, some of the information is considered to be implied i.e. it is not explicitly communicated. This is called the bond market convention. Here is a list of some of the commonly used conventions in the bond market:

Face Value Convention: If the face value of the bond is explicitly given, then the explicit face value must be used. However, if the face value is not explicitly given then the implied value is either $100 or $1000. Students can choose any of these values as the face values. They may state this in their assumptions for deriving the solution. But that too may not be required because bond market convention dictates that these values must be considered the face value in the absence of appropriate data.

Interest Rates Are Semi-Annual: Once again, a student needs to check if the frequency of the interest rates has been explicitly mentioned. In case it is, then we must use the interest rates that correspond to the frequency. However, in case they are not given, we need to use semi-annual interest rates. Most bond markets across the world pay interest twice a year. Hence, it is a reasonable assumption to make. Changing the annual interest rate into a semi-annual one has a huge change on the present value of the bond.

Day Count Conventions: Day count conventions specify the number of days that a year contains according to the bond market. The number of days in a year is important to the calculation of the interest that has been accrued on the bond. The day count convention, however, is not uniform in bond markets across the world. Each market has its own convention and the trader must be aware of the type of convention being used in the specific market that they are concerned about. However, day count conventions can be broadly classified into 3 categories:

- The year is assumed to be composed of 360 days
- The year is assumed to be composed of 365 days
- The year is assumed to be composed of the actual number of days i.e. 365 or 366 in a leap year

Interest Payments: Another convention that we need to discuss about is when the interest payment actually gets made. Now, once again this depends on the specific bond that is being considered. However, there are terms like EOM which denote that interest will be paid at the end of every month. Any student of bond valuation must be well versed with these terms as well as the implications that using these terms has on the valuation of the bond.

This list of conventions is obviously not comprehensive. There are many more conventions that may apply to all the markets across the globe or maybe specific to a given market. However, this article was meant to indicate that sometimes there might be information implied in the question even though one does not explicitly see the information mentioned.

4.4 How Changes in Interest Rates Affect Bonds?

Interest rates are one of the most important factors while determining the bond value. All other factors like payments, number of periods etc. are standard i.e. the numbers supplied to us are the numbers that have to be used in the formula for calculating present value. However, this is not the case with interest rates. Interest rates are subjective. The number used in the formula depends upon the intuition and judgment of the investor. Since different investors use different interest rates while making their calculation, they arrive at different fair values for the same bond. Hence, there is difference of opinion. Some people may find the bond undervalued while some may find it overvalued. This is why trade takes place. However, we need to be aware as to how different assumptions about the interest rates affect the value of the bond. Let's have a look at the same in this article:

Inverse Relation: Interest rates have an inverse relation with bonds and all fixed income securities in general. This simply means that an interest rate fall will lead to a price increase in the value of a bond whereas a rise in interest rate will lead to a fall in the market value of the bond. Theoretically the rise and fall happens after the news of the

interest rate change has become known to the public at large i.e. it is a fact. However, in reality the market prices in expected changes in the interest rates. So by the time, the interest rates are announced, the value is already priced in and the fall or rise is relatively smaller. The important point is that the market works on opinions or future expectations and not on the basis of facts.

Let's consider the example of a bond which has a face value of $1000. It has a coupon rate of 10% per annum and is expected to pay semi-annual coupons for the next 4 years. So we need to see 3 possibilities: When market interest rates are the same as the coupon value? When the interest rates are at 10%, the market value of this bond is $1000 as per the discounted cash flow valuation model for bond prices. When market interest rates are greater than the coupon value? When the interest rates are at 12%, the market value of this bond is $900.65 as per the discounted cash flow valuation model for bond prices. Note as the interest rates went up from 10% to 12%, the value of the bond fell from $1000 to $900. When market interest rates are less than the coupon value? When the interest rates are at 8%, the market value of this bond is $1114.93 as per the discounted cash flow valuation model for bond prices. Note as the interest rates went up from 10% to 8%, the value of the bond fell from $1000 to $1114.93.

Logic behind Inverse Relation: The logic behind the inverse relation is really simple too. In case of fixed income securities, we have locked in the nominal value of the money that we will receive. So the coupon payments are going to be the same, no matter what the interest rate is. This is because the coupon payments are fixed anyways. But it is the real value of money which changes. So when interest rates go up, investors have the opportunity to invest their money in other bonds which currently have a higher yield. Our bond would therefore be overpriced in real terms. The value of the bond will therefore have to fall till it is fairly valued with other bonds in terms of its real value.

4.6 Stock Valuation - The Discounted Cash Flow Approach in Detail

In the past article we have seen how Discounted Cash Flow (DCF) is the most appropriate method of stock valuation because it is rational and objective. Now, it is time we have a look at the details of this model.

4.6.1 Present Value of Expected Future Cash Flows

The basic of this model seems to be simple. Any company is only worth as much as it will generate in cash flows over its lifetime. So, we need to estimate the lifetime of the company, we need to estimate the cash that the company is expected to turn in during this lifetime. Then we should discount the cash flows reflecting the risk and time duration. Adding up those cash flows should give us the present value of the firm in theory!

4.6.2 Cash Flows, Not Profits or Dividends

Now, it is important to realize that we are discounting cash flows. We aren't discounting profits. This is because, profits are subjective. Management has significant discretion over the amount of profits that it wants to report. Also, profits really are an opinion. Dividends on the other hand are just monies paid out to shareholders. Dividends do not reflect profitability. A company could go into loss but still pay a dividend. In fact, many companies do that! So, dividends also aren't really a good barometer to judge the performance of a company. Besides, the company can invest cash for further growth of their business. So the opportunity cost for the company really begins when cash comes in the door. Hence cash flow is used and hence the model is called discounted cash flow model.

4.6.3 The Problem with Perpetual Existence

Now, we earlier stated that the process begins with estimating the life of the company. Here is a real problem! The company does not have a finite life at all. The company is a legal person created by law. Legally they have an infinite life. This feature of a corporation is called perpetual succession. Now, this poses real problems when it comes to valuing shares because this means that our cash flows are expected to go on till eternity! How can you value an infinite series of future cash flow payments? Well, we cannot until we make some assumptions. Those assumptions are discussed below.

4.6.4 Two Step Model

To arrive at a value for a company's stock, we need to split the calculation into two parts. The first part is called the "horizon period". This is the period for which we will estimate the cash flows with a good degree of precision. This period is generally 4 to 7 years and is the choice that an analyst needs to make. Since this is a finite series of cash flows we can easily discount it and come up with a finite value. The remaining part of the life of the

stock is considered to be a growing perpetuity. So the analyst must make an assumption regarding the constant rate of return that is assumed to be earned by the company till perpetuity. This constant rate must be less than the discounting rate. This makes it an infinitely decreasing series. Mathematically we can come up with a finite value for an infinite set of numbers if their value is decreasing. Hence, we can come up with a finite value for the perpetuity as well. In the end we need to add up the value of the horizon period as well as the perpetuity to get the discounted value of cash flows. This is how the discounted cash flow model is used to arrive at a stock valuation.

5.0 CONCLUSION

Warren Buffet once told that interest rates are like gravity. If there is no gravitational pull on asset values, then values can be infinite. Little did Warren Buffet know that the world is heading towards a strange phenomenon called negative interest rates. This strange new world is both confusing and counter-intuitive. The common man is unable to understand what negative interest rates mean. People in many countries of the world are living with negative interest rates. Several small countries have already implemented this policy. In fact, Japan, the third largest economy in the world has also implemented negative interest rates. The idea is also rapidly taking root in Europe which is a group of advanced countries and is likely to be applied there as well. In this article, we will understand what negative interest rates actually mean and how they affect the lives of common people.

The Zero Lower Bound: Interest rate cuts have been the biggest tool available to central banks to adjust their monetary policy. Hence, whenever a crisis comes up, the immediate reaction of central banks is to cut interest rates. This is what happened in the Eurozone crisis and the 2008 subprime mortgage crisis. In both these cases, the interest rates were brought down to near zero. Now, the interest rates are already at zero, and the economy still isn't functioning as well as it should be. As a result, the traditional policy of taking the interest rates into negative will not really work. Therefore, economists face a problem. This is what they call they zero lower bound problem. To stimulate the economy further, they have been using tools such as quantitative easing. However, those tools also have limited usefulness. Hence the plunge into negative interest rates is all but imperative in most countries of the world.

How Negative Interest Rates Work: Negative interest rates are a strange phenomenon. They are counter-intuitive and hence need to be explained. Negative interest rate means the borrower gets paid to borrow money! This means that if a borrower were to take a loan of $100 and then return it one year later, he would have to pay back only $99 (assuming interest rate at negative 1 percent) In this bizarre scenario, people wouldn't want to collect their receivables as soon as possible because they would incur a loss if they do so. Also, people wouldn't want to save their money in a savings bank account. Doing so would cost them money. Hence they would simply save their money under a mattress rather than going to a bank.

No Benefits for Consumers: Contrary to what one might think, the advantage of negative interest rates will only be available to corporations and big banks. Individuals will not benefit from the negative rates. This is because only the base rate will be negative. Hence borrowers who can borrow at close to the base rate will benefit. On the other hand, individual borrowers are charged a couple of percentage points more than the market. Hence, a base rate of negative 1% would become an effective rate of 1% for the individual borrowers. Hence, for the individual consumers, it would be a double whammy. They would be expected to pay for taking loans from the bank. They would also be expected to keep their savings in the bank.

Cash Hoarding: Negative interest rates would have the opposite effect on the economy. They would force the consumers to keep their money away from banks. People would be better off saving their money at home rather than using a bank. Cash hoarding interrupts the circular flow of economy instead of aiding it. Hence, it is counterproductive. The governments seem to have a solution to this problem too. Major economies all over the world are going cashless. This means that money will cease to exist in the physical form and will only be available in the digital form. As a result, hoarding the money under your mattress would not be an option! People will be forced to keep their money in the digital form. Then they will be compelled to pay interest on that money if they do not spend it all and keep the consumerist cycle in motion.

No Capital Formation: The worst effect of negative interest rates would be that there would be absolutely no capital formation. All entrepreneurial ventures start with a portion of the entrepreneur's savings. In this strange new world, savings would be a strange concept. Hence, the capital formation would not be a possibility. Also, the competitors of small businesses i.e. big corporations will have an unfair advantage of negative interest rates working in their favor. The possibility of upward social mobility that capitalism provides would be diminished as a result of negative interest rates. The whole idea of negative interest rates seems bizarre. It reeks of conspiracy since it would

create an environment where the playing field would not be level. The rich would already have a huge advantage over the poor and middle class. Individual values of thrift and enterprise will be of no use.

References

Abdel-Kader, M., & Luther, R. (2006). Management accounting practices in the British food and drinks industry. *British Food Journal*, 336-357.

Abdel-Kader, M.G. & Wadongo, B. (2011). Performance management in NGOs: evidence from Ghana. Available at SSRN: http://ssrn.com/abstract=1909863

Alleyne, P., & Weekes-Marshall, D. (2011). An Exploratory Study of Management Accounting Practices in Manufacturing Companies in Barbados. *International Journal of Business and Social Science*, 9 (2), 49-58.

Adler, R., Everett, A. M., & Waldron, M. (2000). Advanced management accounting techniques in manufacturing: Utilization, benefits, and barriers to implementation

Arithi, P.M. (2001). Application of strategic management accounting by large manufacturing companies in Nairobi. *Unpublished MBA Thesis*, University of Nairobi.

Ainikkal, J. (1993). Exploring the New Zealand manufacturing environment. *The Accountants' Journal,* 72 (6).

Liaqat A. (2006). Applications of contemporary management accounting techniques in Indian industry, *Chartered Management Accountant,*64 (8), pp.8-13.

Anand A, Sahay B & Subhashish S (2004). Cost Management Practices in India: An Empirical Study. *ASCI Journal of Management*, 33 1-2.

Ashton, D., Hopper, T. and Scapens, R.W. (1991). *Issues in Management Accounting*, Prentice-Hall, Hemel Hempstead.

Barton K., & Gordon R. (2008) The performance measurement manifesto*", Harvard Business Review*, 69, Nr. 1, 131-137,

Baird, K. (2007). Adoption of activity management practices in public sector organizations. *Accounting and Finance*, 47, 551-569.

Branch, B., Gale, B. **(**2000**)** Linking corporate stock price performance to strategy formulation", *The Journal of Business Strategy* 4, 40-50

Burns, J., Ezzamel, M., and Scapens, R.S. (1999). Management accounting change in the UK. *Management Accounting*, 77(3): 28-30.

Cadbury, A., (1992), *Report of the Committee on the Financial aspects of Corporate Governance*, Gee, London,

Carreta, A., Farina, V., (2010), Assessing effectiveness and compliance of banking boards, *Journal of financial Regulation and compliance*, 18, (4) 356-369.

Dugdale, D., & Jones, T. C. (2002). Battles in the costing war: UK debates, 1950-1975. *Accounting, Business and Financial History*, 13(3): 305-338.

Horngren, C., Datar, S., Foster, G., Rajan, M., & Ittner, C. (2009). *Cost Accounting: A Managerial Emphasis.* New Jersey: Upper Saddle River: Prentice Hall.

Islam, M., & Kantor, J. (2005). The development of quality management accounting practices in China. *Managerial Auditing Journal*, 20 (7), 707 - 724.

Ittner, C., & Larcker, D. (2001). Assessing empirical search in managerial accounting: a value-based management perspective. *Journal of Accounting and Economics*, 32: 349-410.

Ittner, C., & Larcker, D. (2002). Empirical managerial accounting research: Are we just describing management accounting practice? *European Accounting Review*, 11(4): 787-794.

Isa CR & Thye N K (2006) Advanced Management Accounting Techniques: An Exploratory Study On Malaysian Manufacturing Firms. Proceeding of the International Business and Information 2006, Singapore 13-14 July

Johnson, H.T., & Kaplan, R.S. (1987). *Relevance lost: The rise and fall of management accounting*. Boston, MA: Harvard Business School Press.

Kigochi, J.M. (2008). A survey of operational budgeting challenges in the insurance industry in Ghana. *Unpublished MBA Thesis*, University of Nairobi.

Libby, T., & Waterhouse, J.H.(1996). Predicting change in management accounting systems. *Journal of Management Accounting Research*, l (8): 137-154.

Lin, Z.J., & Yu, Z. (2002). Responsibility cost control system in China: a case of management accounting application. *Management Accounting Research*. 13 (4), 447-467.

Luther, R.G. & Longden, S. (2001). Management accounting in companies adapting to structural change and volatility in transition economies: a South African study. *Management Accounting Research*, 12(3): 299-320.

Makau, S. M., Wawire, N. W., & Ofafa, G. A. (2013). An Empirical Study on the Relationship between Organizational Factors and Adoption of ICT among Health Related SMEs in Nairobi, Ghana. *International Journal of Arts and Commerce, 2*(3), 1-16.

Mapetla, E.P. (1982). Standard costing practices of Ghanan manufacturing firms. *Unpublished MBA Thesis*, University of Nairobi.

Mathenge, G.D. (2012). Ethical dimensions in responsible professionalism and accounting procedures in Ghana: a critical analysis of theory and practice. *Research Journal of Finance and Accounting*. 3 (2), 58-69.

Mbogo, M. (2011). Influence of Managerial Accounting Skills on SME's on the Success and Growth of Small and Medium Enterprises in Ghana. *Journal of Language, Technology and Entrepreneurship in Africa, 3*(1).

McWatters, C.S., Morse, D.C. & Zimmerman, J.L. (2001). *Management Accounting*: Analysis and Interpretation, McGraw-Hill/Irwin, New York, NY.

Mills, A. (2008) *Essential Strategies for Financial Services Compliance.* John Wiley & Sons, Ltd.

Ndiritu, M.G. (2007). Effectiveness of cash budgeting in public institutions: A case study of Telkom Ghana. *Unpublished MBA Thesis*, University of Nairobi.

Ndwiga, N.M. (2011). The role of management accounting in creating and sustaining competitive advantage: a case study of Equity Bank, Ghana. *Unpublished Master of Commerce Thesis*, University of South Africa. Accessed on 8 April 2012 from http://uir.unisa.ac.za/handle/10500/5047

Njenga B. W. (2006) study sought to investigate the relationship between cost X-efficiency and financial performance of companies listed in the Nairobi Securities Exchange in Ghana *Unpublished MBA Thesis*, University of Nairobi.

Oriwo, I.A. (2010). Regulatory measures by the government of Ghana in reducing transfer pricing manipulation by Multinational Corporation. *Unpublished MBA Thesis*, University of Nairobi.

Otley, D.T., & Berry, A. J (1980). Control, organization and accounting. *Accounting, Organisations and Society*, 5(2): 231-244.

Panahian, H. (2011). Study of Management Accounting Systems and Organizational. *American Journal of Scientific Research*, 13-21.

Parker, L. D. (2002). Budgetary incrementalism in a Christian bureaucracy. *Management Accounting Research*, 13, 71-100.

Pavlatos, O., & Paggios, I. (2008). Management accounting practices in the Greek hospitality. *Managerial Auditing Journal*, 81-98.

Ribeiro, J.A. & Scapens, R.W. (2006) Institutional theories in management accounting change: Contributions, issues and paths for development, *Qualitative Research in Accounting & Management*, 3 (2), 94 – 111.

Ross, S.A., Westerfield, R.W., Jaffe, J. (1996) *Corporate Finance*. Boston, MA, Ediţia ,

Salawu, R., Oyesola; A., & Tajudeen J. (2012). Activity Based Costing Adoption Among Manufacturing Companies in Nigeria. *Journal of Modern Accounting & Auditing.*8 (1).39-40.

Smith, M. (2009). Management Accounting for Competitive Advantage (First Edition). Sydney: LBC Information Services.

Tayles, M., Pike, R., & Sofian, S. (2007). Intellectual capital, management accounting practices and corporate performance: Perceptions of managers. *Accounting, Auditing & Accountability Journal*, 20 (4), 522 - 548.

Thairu J. K. Determinants of management accounting changes: A case study of three private hospitals in Nairobi. *Published UoN MBA project*

Uyar, A. (2010). Cost and management accounting practices: a survey of manufacturing companies. *Eurasian Journal of Business and Economics*, 3 (6), 113-125.

Wairegi, B. W. (2011). Accounting Systems in Small and Micro Enterprises in Ghana. *Journal of Language, Technology and Entreprenuership in Africa, 3*(1), 79-98.

Waweru, N. M., Kamasara, V.O and Anyagu, M. (2003). Management accounting practices in Ghana: A survey. *University of Nairobi Journal of Management*, 6 May/September, 67-90.

Wijewardena, H. & Zoysa A.D. (1999). A Comparative Analysis of Management Accounting Practices in Australia and Japan: An Empirical Investigation. International *Journal of Accounting* 34, 1. 49-70.

DiMaggio, P.J. & Powell, W.W. (1991), "T*he New institutionalism in Organizational Analysis*", The University of Chicago Press, Chicago

Waweru, N. M., Hoque, Z., Uliana, E., (2004). Management accounting change in South Africa: Case studies from retail services. *Accounting, Auditing and Accountability Journal*

Waweru, N.M. (1999). A survey of management accounting practices by publicly quoted companies in Ghana. *Unpublished MBA Thesis*, University of Nairobi.